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hereby certify that annexed is a true copy of the Provisional specification in  
connection with Application No. PQ 1210 for a patent by EVATECH PTY  
LIMITED filed on 25 June 1999.

WITNESS my hand this  
Eleventh day of July 2000

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ADMINISTRATION



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**Diverter Valve/Filter and Downpipe Filter**

The invention is described in the following statement:

FIELD OF THE INVENTION

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The following invention relates to a diverter valve and filter arrangement, typically adapted to receive water from a downpipe from the eaves of a building. The invention also relates to a downpipe filter.

- 10 It is known to collect rainwater from roof gutters and store the same in large storage tanks. When the stored water is intended for human consumption, it ought to be substantially devoid of sediment.

- 15 It is known to provide the inlet to water storage tanks with a filter to prevent the ingress of sediment and leaves for example. Such filters or strainers are effective, but not highly efficient in removing water borne debris.

- 20 It might also be desirable to provide a filtration means for connection in line with a downpipe to filter water prior to its entry to underground pipes so as to prevent the blockage of those pipes.

OBJECT OF THE INVENTION

- 25 It is the object of the present invention to overcome or substantially ameliorate the above disadvantages and/or more generally to provide an improved diverter valve and filtration unit and also to provide an improved downpipe filter.

## DISCLOSURE OF THE INVENTION

In one form of the invention there is provided

- a downpipe filter including an inlet to receive water from a roof gutter,
- 5 a first branch from the downpipe for directing diverted water from the downpipe to a filter,
- a return branch from the filter for returning filtered water to the downpipe, and
- another filter to filter water from the downpipe and situated between the first branch and the return branch.

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Preferably the filters are stainless steel gauze filters.

Preferably there is associated with the first branch a dirt trap to trap dirt which is filtered by the filters.

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Preferably the dirt trap has a removable bung to enable cleaning of dirt from the dirt trap.

- Preferably there is provided upstream of the first branch a safety plug which is
- 20 designed to open and allow release of water from the downpipe if the filters become blocked to a degree sufficient to cause a backup of water in the downpipe.

- Preferably downstream of the return branch there is provided a secondary filtration unit including a second branch from the downpipe which delivers water to a fine filter,
- 25 water having passed through the fine filter then being returned via a second return branch to the downpipe.

- Preferably there is provided a further filter in the downpipe in between the second branch and the second return branch.

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Preferably the fine filter is a fine sock filter.

Preferably there is provided a removable bung above the fine sock filter.

Preferably both removable bungs are threadably engaged with the filtration unit.

5 In another form of the invention there is provided:

a diverter valve/filter unit, including:

a branch extending from a downpipe for passing water diverted from the downpipe and returning the water to the downpipe via a water tube and return branch,

a shut-off valve for closing the downpipe downstream of the return branch,

10 a filtration device associated with the water tube,

a water flow rate detection device calibrated to measure the flow rate of water through the downpipe and to close the shut-off valve upon detecting a predetermined flow rate of water through the downpipe, whereupon water backs up in the water tube for bypassing via the filtration device to a storage tank, and wherein said shut-off valve is opened by the flow rate detection means upon detecting a diminished flow rate of water to the downpipe to enable water from the return branch to be delivered to the downpipe at a downstream position.

15 Preferably the filtration device includes a secondary filter downstream of a primary filter.

Preferably the primary filtration device includes a dirt trap associated with the branch which extends from the downpipe, there being further provided one or more filter screens between the branch and the water pipe.

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Preferably both the primary and secondary filters have associated therewith removable bungs to enable cleaning of the filters.

Preferably the water flow rate detection device includes a cylinder mounted within the downpipe downstream of the branch therefrom, the cylinder being movable up and down along the downpipe and being biased upwardly by biasing means, the cylinder having a hollow interior to receive water from the downpipe and including a drain to

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slowly release water therefrom, the cylinder gaining weight as it fills with water so as to counteract the bias of the biasing means so as to move the shut-off valve.

5 Preferably the drain is a hollow shaft extending downwardly from the cylinder and the shut-off valve is mounted to the shaft.

Preferably a shut-off valve closes against a valve seat situated within the downpipe.

10 Preferably the rate of water flow delivered to the cylinder is adjustable by means of a valve tap situated upstream thereof.

Preferably an extendible bellows extends from the valve cap to the upper end of the cylinder.

15 Preferably the biasing means is a coil spring through which the shaft extends.

Preferably associated with the drain is a valve tap which enables adjustment of the emptying rate of the cylinder.

20 Preferably the drain drains to a downstream position of the downpipe.

Preferably a plug is situated downstream of the valve tap.

25 In both the downpipe filter and diverter valve/filter unit as disclosed above, a safety plug can be provided upstream to enable a burst and exit of water should the units become clogged with debris downstream thereof.

#### BRIEF DESCRIPTION OF THE DRAWINGS

30 Preferred forms of the present invention will now be described by way of example with reference to the accompanying drawings wherein:

Figure 1 is a schematic elevational view of a downpipe filter unit; and  
Figure 2 is a schematic elevational view of a diverter valve/filter unit.

## DESCRIPTION OF THE PREFERRED EMBODIMENTS

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In Figure 1 of the accompanying drawings there is schematically depicted a downpipe filter unit 10. Unit 10 is to be fitted in line with a downpipe 19 which would ordinarily take the water from a roof gutter to an underground stormwater pipe. A first branch 18 extends from the downpipe 19 at a position just upstream of a stainless steel gauze filter 12. Water-borne debris within the first branch 18 is delivered to a dirt trap 14 just downstream of another stainless steel gauze filter 13 through which water is returned via a return branch 22 to the downpipe 19. Further downstream of the downpipe there is provided a second branch 20 just upstream of a stop end 23. The pre-filtered water passing through the second branch 20 is delivered to a fine filter sock 17 from which the filtered water is returned via a return branch 21 to the downpipe 19.

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Beneath the dirt trap 14 there is provided an unscrewable bung 15, the removal of which enables cleaning of the dirt trap 14.

Similarly, associated with the fine filter sock 17 is another removable bung 16 to enable removal and cleaning of the fine filter sock.

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In the event that both of the stainless steel gauze filters 12 and 13 become blocked, and/or in the event that the fine filter sock 17 becomes blocked, the system is provided with a safety plug 11 which will burst should water bank up thereto.

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The above described filter unit is intended to filter storm water from eave guttering prior to delivering it to the storm water system.

In Figure 2 of the accompanying drawings there is schematically depicted a diverter valve/filter unit 30, the intended function of which is twofold. Firstly, the system is

intended to deliver clean filtered water via an outlet 46 to a storage tank during times of heavy rain when relatively clean water is flowing to the downpipe, most gutter debris having already been flushed to storm water. Secondly, the system is designed to filter the water from the roof gutter prior to delivery of the water to the stormwater system.

The unit 30 includes a first branch 56 extending from a position just upstream of a gauze filter 32 within the downpipe 31. Within the first branch 56 there is provided a stainless steel gauze filter 54 at the upper end of a vertical water tube 50. Water which does not pass through the filter 54 is delivered to a dirt trap 52 situated just downstream of another gauze filter 53 through which water is filtered and delivered via a cross-branch 57 to the water tube 50. Associated with the dirt trap 52 is a threaded removable bung 51 to enable cleaning of the dirt trap 52. Downstream along the water tube 50 there extends a second branch 58 having a gauze filter 48 therein. Water passing through the gauze filter 48 is presented to a fine filter sock 47 from which filtered water is delivered via outlet 46 to a storage tank. The bottom end of the water tube 50 is connected to a return branch 59 through which water is returned to the downpipe via a valve system to be described below.

Between the downstream part of the sock filter 47 and the water tube 50 there is provided a stop end 45 having a small hole 60 therethrough.

The valve system includes a cylinder 35 adapted to move up and down within the downpipe 30. The cylinder 35 is adapted to be filled with water which passes through the gauze filter 32. A valve tap 33 is provided downstream of the filter 32 to control the flow of water to the cylinder. Between the valve tap 33 and the top of the cylinder 35, there is provided a rubber boot 34 which can extend and contract. Water passes through the rubber boot to the interior of the cylinder 35. Cylinder 35 might be formed of rigid plastics material or metal for example.

The bottom of the cylinder 35 is supported by a compression spring 36, the bottom end of which bears upon a seal 37 fixed to the interior of the downpipe. A hollow tube

or rod 44 passes through the coil spring 36 and the seal 37 and serves as a drain for water in the cylinder 35. A valve tap 42 is provided at the bottom end of the rod 44 to enable adjustment of the rate at which water drains from the cylinder.

5 A valve, stopper or plug 38 is fixed to the rod 44 and is adapted to bear against a valve seat 39 within the downpipe. When the cylinder 35 fills with water during times of heavy rain, the weight of the cylinder bears against the spring 36 and presses the valve 38 against the valve seat 39 so as to stop the flow of water from return branch 59 to the stormwater system via waste outlet 40. Water still passes to waste outlet 40, being  
10 that which passes through the rod 44 and tap 42. When the valve 38 closes, water within the water tube 50 banks up so as to promote the flow of water via the second branch 58 to the fine filter sock 47 and then via outlet 46 to the storage tank. So long as the rain continues to fall heavily, the valve 38 will remain closed. When the rain dies down, the cylinder 35 will drain through tap 42, causing valve 38 to open as a  
15 result of spring force allowing the water from water tube 50 to pass to stormwater via outlet 40. A small hole 60 in the stop end 45 prevents water being trapped in the tank delivery pipe 46. Such trapped water might otherwise become stagnant.

A plug 43 enables access to the tap 42 for adjustment and maintenance.

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It should be appreciated that modifications and alterations obvious to those skilled in the art are not to be considered as beyond the scope of the present invention. For example, means might be provided for storing relative unfiltered water outlet from point 40 in Figure 2 for the purpose of watering dry areas such as trees or shrubs.

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Furthermore, there may be ways of effecting movement of a valve 38 other than by use of a water tube as disclosed herein.



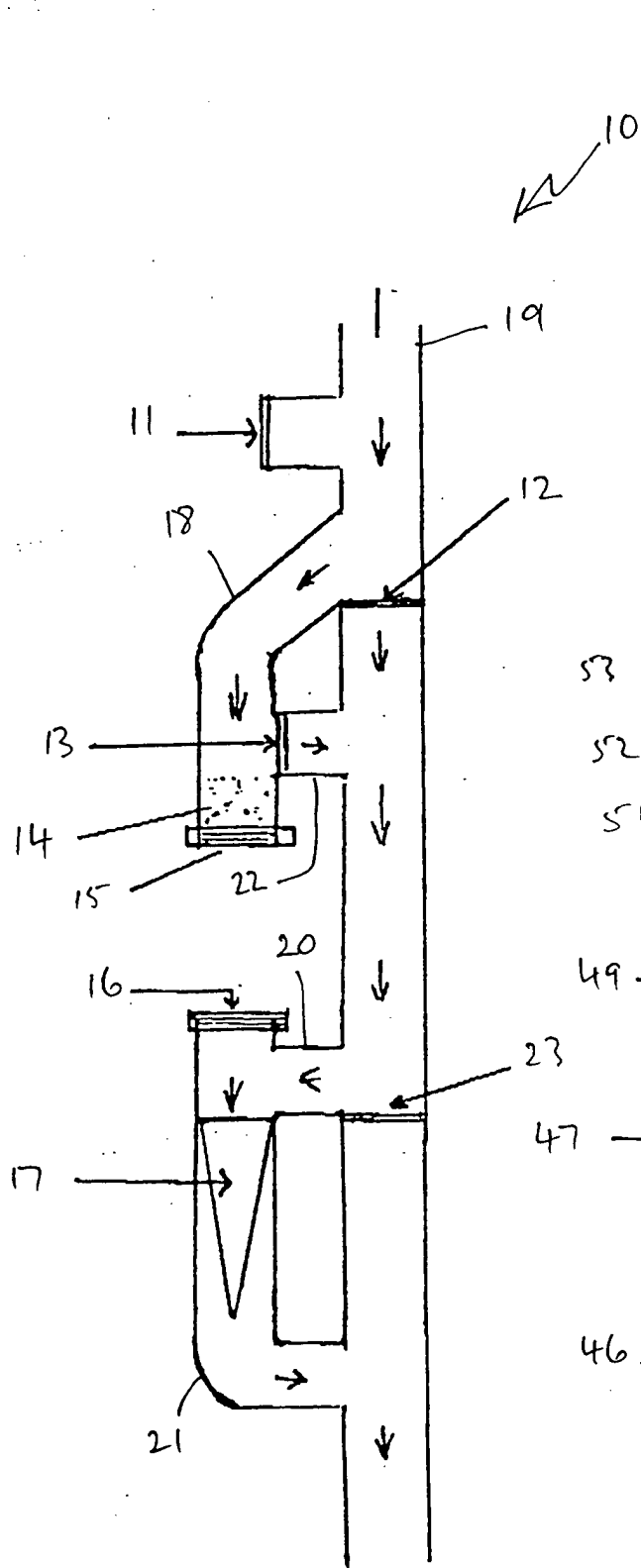


FIG. 1

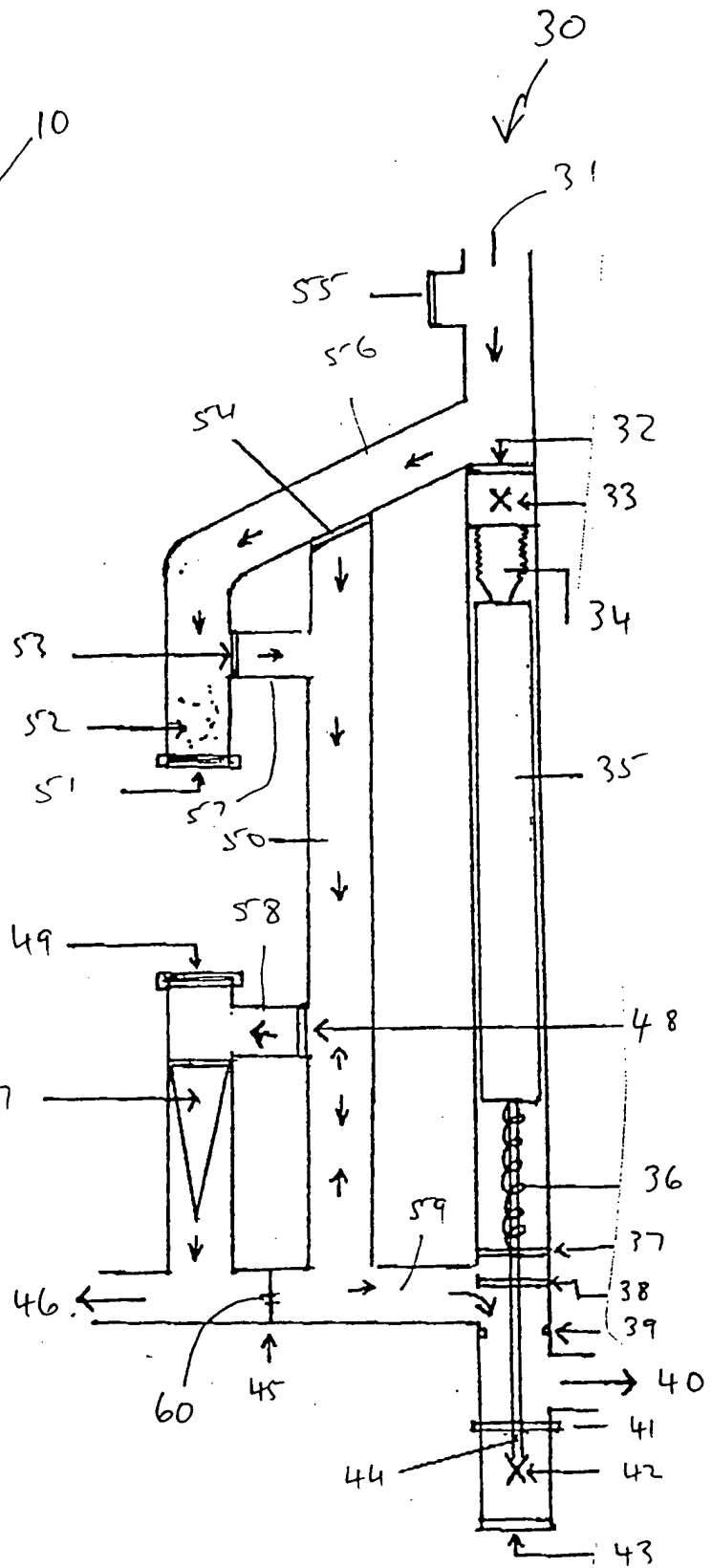


FIG. 2